
Space Weather Technical Forecast

Issued on Monday, 01 August 2022 at 00:26 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Slight Chance of G1/Minor Storm intervals day 1. Active electron fluence likely by day 4.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with one C9.2 flare from the eastern limb around 31/2310 UTC. There are currently two sunspots on the visible disc. AR3068 is the largest region, with a slight increase in length in the past 24 hours but no notable increase in complexity. AR3062 near the southwest limb remains small and simple. No Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: Solar winds, as measured by DSCOVR at L1, indicate the recent/ongoing arrival of a HSS. Wind speeds have risen to around 500 km/s. Density started around average before rising to 19 ppcc around 31/1945 UTC then fell back to below average. The total interplanetary magnetic field (IMF), Bt was generally moderate, with a max peak of 15nT at 31/2120 UTC. The north-south component, Bz, fluctuated moderately at times, between +10/-8nT. The Phi angle was mostly negative (towards the Sun). Geomagnetic activity was mostly Quiet (Kp 1-2) with a couple of Unsettled and Active periods (Kp 3 & 4).

Energetic Particles / Solar Radiation: The high energy proton flux (10 MeV), as measured by GOES-16 was at background levels. The high energy electron flux (greater than 2MeV) varied between background and moderate levels, with a brief peak at high levels of 1370pfu observed at 31/1540 UTC. Electron fluence showed a decreasing trend, remaining well below the Active threshold (1e8 integrated flux), with an observed fluence value of 8.78e6 integrated pfu recorded at 01/0000 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Low solar activity is expected to continue, with only a very slight chance of M-class flares. Flare risks are elevated from raw probabilities due to active regions rotating onto the visible disk in coming days.

Solar Wind / Geomagnetic Activity: No Earth directed CMEs are currently expected. Solar winds are elevated due to the onset of the HSS from CH07/-, a northward extension of the southern polar crown. CH07/- is a long feature spanning nearly 50 degrees of longitude along the southern hemisphere, therefore solar winds are expected to remain elevated or slightly elevated until later on day 3 or day 4 (03 or 04 Aug), when wind speeds are expected to fall back to background levels.

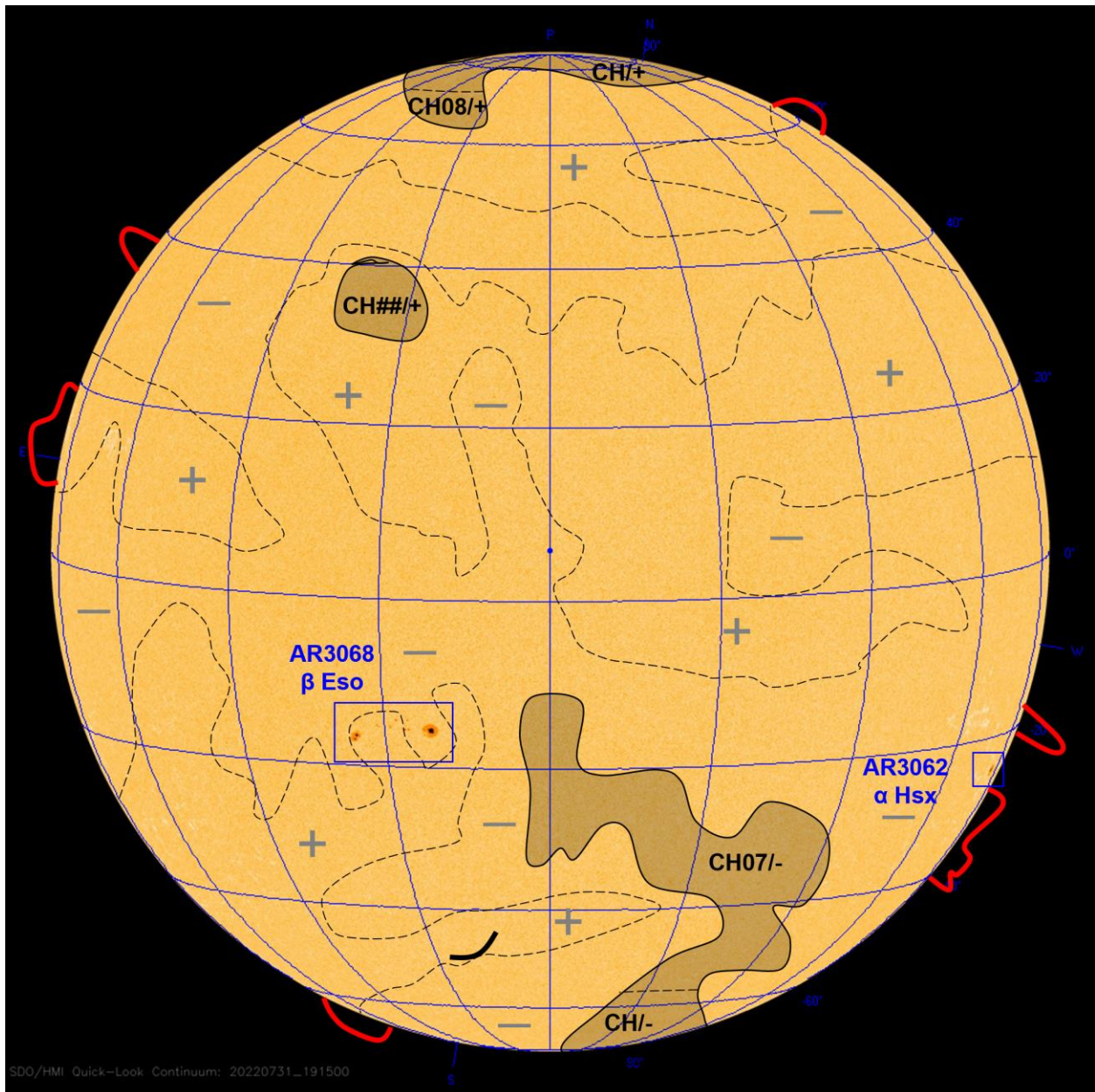
Initially, Unsettled or Active intervals are likely with a slight chance of G1/Minor Storms on Day 1 due to the continued onset of the HSS. Geomagnetic activity should become Quiet with a chance of isolated Unsettled or Active intervals through the period.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) is expected to remain at background levels. The high energy electron flux (greater than 2 MeV) is expected to remain mostly at background to moderate levels, but with a chance of rising later to give high levels at the diurnal maxima, perhaps becoming prolonged high by day 4 (04 Aug).

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The corresponding 24 hour fluence is most likely to remain below the Active threshold (1e8 integrated pfu) until day 4 when the cessation of the HSS from CH07/- will make Active fluence likely.

Figure 1. Solar Analysis Valid 31/2000 UTC.



Key: Filament ____, Prominence ____, Magnetic Field Line - - -, Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-γ-δ and Zurich-McIntosh Axx etc.

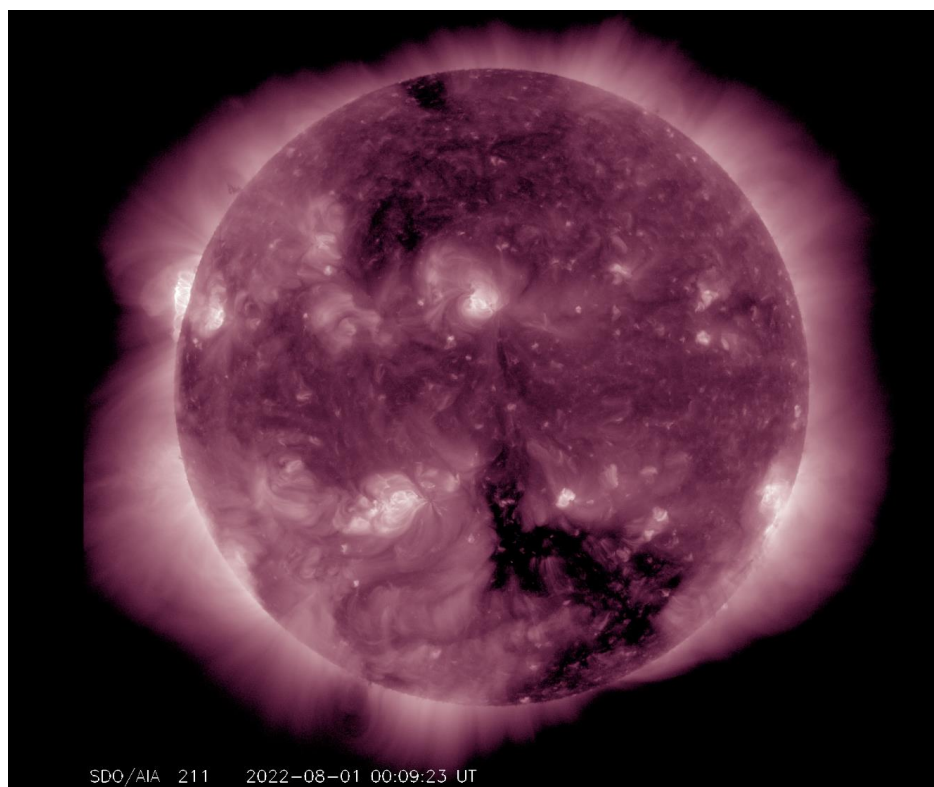
Geomagnetic Storms:

No Earth directed CMEs are currently expected. CH04/+ is currently thought to have missed earth, and instead we are now seeing elevated solar winds due to the onset of the HSS from CH07/-. This is a large northward extension of the southern polar crown, spanning nearly 50 degrees of longitude along the southern hemisphere. Solar winds are expected to remain elevated or slightly elevated whilst in the HSS of CH07/-, which could be up to around 75-90 hours. This would take us to later on day 3 or more likely until day 4 (03 or 04 Aug), when wind speeds are expected to fall back to background levels.

Initially, Unsettled or Active intervals are likely with a slight chance of G1/Minor Storms on Day 1 due to the continued onset of the HSS. Geomagnetic activity should become Quiet with a chance of isolated Unsettled or Active intervals through the period.

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	15	10	10	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Figure 2: SDO AIA 211 imagery showing large coronal hole in the south.

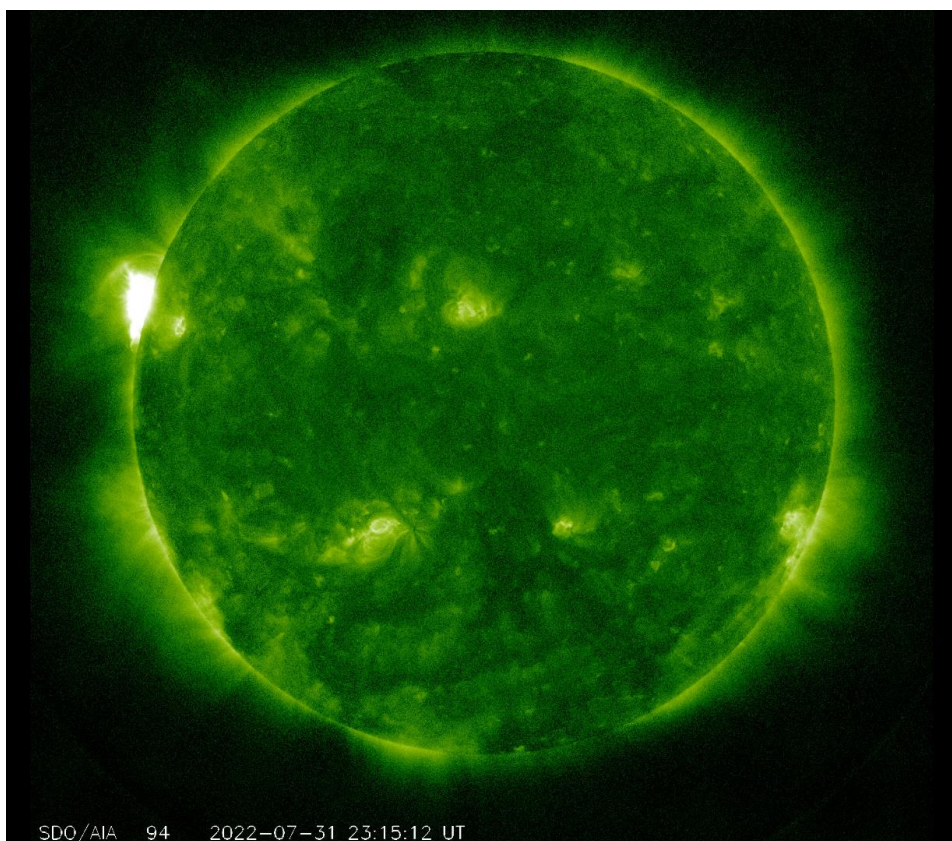


Radio Blackouts - X-Ray Flares:

Solar activity is currently low, with a single C9.2 flare around 31/2310 UTC. This originated from just around the northeast limb. There remain two sunspot groups on the Earth-facing disc, with the largest region being AR3068 (Esi/Beta) approaching the central meridian. AR3062 near the southwest limb remains small and stable, this spot is expected to rotate onto the western limb and off the visible disk in the next 24 hours. STEREO imagery suggests the potential for further active regions to rotate onto the Earth-facing disc through the period. Activity is expected to remain Low, with a chance of rising to Moderate from any M-flares.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X Class	No	1	1	1	1

Figure 3: SDO AIA 94 imagery showing C9.2 flare around 2300 UTC on 31st.



Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) is currently at Background levels and is expected to remain at this level through the period.

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)

High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) is initially expected to remain mostly at background to moderate levels due to the suppression effects of the HSS from CH07/-. There is a chance of flux levels rising later to give high levels at the diurnal maxima by day 3, then perhaps becoming prolonged high by day 4 (04 Aug) as the charging effects of the HSS become apparent.

The 24 hour fluence is most likely to remain below the Active threshold (1e8 integrated pfu) until day 4 when the cessation of the HSS from CH07/- will make Active fluence likely.

GEO Electron Environment	Level (cm ⁻² sr ⁻¹ day ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ 1x10 ⁸	No	1	1	20	60
Very Active	≥ 2 MeV ≥ 1x10 ⁹	No	1	1	1	1

Figure 4: GOES 16 electron Flux trace past 24 hours

